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... To test the power of **simulated annealing**. ... Combinatorial **Optimization** ... consists of a set of problems that are central to the disciplines of **computer science** and ...

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E Aarts, J Korst - 1989 - John Wiley & Sons, Inc. New York, NY, USA

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Simulated annealing: theory and applications - group of 2 »

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... problems, Metaheuristics: **computer** decision-making, Kluwer Academic Publishers, Norwell, MA, 2004. Mark Bucci, **Optimization with simulated annealing**, C/C++ ...

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B Hajek - Mathematics of Operations Research, 1988 - portal.acm.org

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WL Goffe, GD Ferrier, J Rogers - Journal of Econometrics, 1994 - decom.ufop.br

... Combinatorial **simulated annealing** has been used successfully in **computer** and circuit design ... Other global **optimization** algorithms have been introduced in recent ...

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S Kirkpatrick - Journal of Statistical Physics, 1984 - Springer

... **Simulated annealing** is a stochastic **optimization** procedure which is widely applicable and has been found effective in several problems arising in **computer**- ...

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DS Johnson, CR Aragon, LA McGeoch, C Schevon - Operations Research, 1989 - JSTOR

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Optimization by Simulated Annealing: An Experimental Evaluation; Part II, Graph Coloring and Number ... - group of 3 »

DS Johnson, CR Aragon, LA McGeoch, C Schevon - Operations Research, 1991 - JSTOR

... 1. THE GENERIC **ANNEALING** ALGORITHM Both local **optimization** and **simulated annealing** require that the problem to which they are applied be describable ...

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L Davis - 1987 - Morgan Kaufmann Publishers Inc. San Francisco, CA, USA

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21 [Architectural level synthesis: Physical-aware simulated annealing optimization of gate leakage in nanoscale datapath circuits](#)

Saraju P. Mohanty, Ramakrishna Velagapudi, Elias Kougianos

 March 2006 **Proceedings of the conference on Design, automation and test in Europe:**
Proceedings DATE '06
Publisher: European Design and Automation Association

 Full text available: [pdf\(445.43 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

For CMOS technologies below 65nm, gate oxide direct tunneling current is a major component of the total power dissipation. This paper presents a simulated annealing based algorithm for the gate leakage current reduction by simultaneous scheduling, allocation and binding during behavioral synthesis. Gate leakage current reduction is based on the use of functional units of different oxide thickness while simultaneously accounting for process variations. We present a cost function that minimizes le ...

22 [Advanced tutorials: Simulation optimization: simulation optimization](#)

Sigurdur Ólafsson, Jumi Kim

 December 2002 **Proceedings of the 34th conference on Winter simulation: exploring new frontiers**
Publisher: Winter Simulation Conference

 Full text available: [pdf\(141.19 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

Simulation optimization has received considerable attention from both simulation researchers and practitioners. In this tutorial we present a broad introduction to simulation optimization and the many techniques that have been suggested to solve simulation optimization problems. Both continuous and discrete problems are discussed, but an emphasis is placed on discrete problems and practical methods for addressing such problems.

23 [Satisfiability test with synchronous simulated annealing on the Fujitsu AP1000 massively-parallel multiprocessor](#)

Andrew Sohn, Rupak Biswas

 January 1996 **Proceedings of the 10th international conference on Supercomputing**
Publisher: ACM Press

 Full text available: [pdf\(823.82 KB\)](#) Additional Information: [full citation](#), [references](#), [index terms](#)

24 An approach for finding discrete variable design alternatives using a simulation



optimization method

Young Hae Lee, Kyoung Jong Park, Tag Gon Kim

December 1999 **Proceedings of the 31st conference on Winter simulation: Simulation--a bridge to the future - Volume 1**

Publisher: ACM Press

Full text available: pdf(158.35 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

25 A decomposition-based simulated annealing technique for data clustering



Kien A. Hua, S. D. Lang, Wen K. Lee

May 1994 **Proceedings of the thirteenth ACM SIGACT-SIGMOD-SIGART symposium on Principles of database systems**

Publisher: ACM Press

Full text available: pdf(1.15 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

It has been demonstrated that simulated annealing provides high-quality results for the data clustering problem. However, existing simulated annealing schemes are memory-based algorithms; they are not suited for solving large problems such as data clustering which typically are too big to fit in the memory space in its entirety. Various buffer replacement policies, assuming either temporal or spatial locality, are not useful in this case since simulated annealing is based on ...

26 Session 6D: Analog synthesis: ASF: a practical simulation-based methodology for the synthesis of custom analog circuits



Michael J. Krasnicki, Rodney Phelps, James R. Hellums, Mark McClung, Rob A. Rutenbar, L. Richard Carley

November 2001 **Proceedings of the 2001 IEEE/ACM international conference on Computer-aided design**

Publisher: IEEE Press

Full text available: pdf(225.63 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This paper describes ASF, a novel cell-level analog synthesis framework that can size and bias a given circuit topology subject to a set of performance objectives and a manufacturing process. To manage complexity and time-to-market, SoC designs require a high level of automation and reuse. Digital methodologies are inapplicable to analog IP, which relies on tight control of low-level device and circuit properties that vary widely across manufacturing processes. This analog synthesis solution aut ...

27 MAELSTROM: efficient simulation-based synthesis for custom analog cells



Michael Krasnicki, Rodney Phelps, Rob A. Rutenbar, L. Richard Carley

June 1999 **Proceedings of the 36th ACM/IEEE conference on Design automation**

Publisher: ACM Press

Full text available: pdf(129.41 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

28 Evolution strategies, evolutionary programming: papers: On the local performance of simulated annealing and the (1+1) evolutionary algorithm



Thomas Jansen, Ingo Wegener

July 2006 **Proceedings of the 8th annual conference on Genetic and evolutionary**


computation GECCO '06**Publisher:** ACM PressFull text available:  [pdf\(176.33 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Simulated annealing and the (1+1) EA, a simple evolutionary algorithm, are both general randomized search heuristics that optimize any objective function with probability converging to 1. But they use very different techniques to achieve this global convergence. The (1+1) EA applies global mutations than can reach any point in the search space in one step together with an elitist selection mechanism. Simulated annealing restricts its search to a neighborhood but employs a randomized selection sc ...

Keywords: evolutionary algorithms, local performance, mutation, run time analysis, selection, simulated annealing

29 What have we learnt from using real parallel machines to solve real problems?

G. C. Fox

January 1989 **Proceedings of the third conference on Hypercube concurrent computers and applications - Volume 2****Publisher:** ACM PressFull text available:  [pdf\(4.08 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We briefly review some key scientific and parallel processing issues in a selection of some 84 existing applications of parallel machines. We include the MIMD hypercube transputer array, BBN Butterfly, and the SIMD ICL DAP, Goodyear MPP and Connection Machine from Thinking Machines. We use a space-time analogy to classify problems and show how a division into synchronous, loosely synchronous and asynchronous problems is helpful. This classifies problems into those suitable for SIMD or MIMD ...

30 Experiments with simulated annealing

Surendra Nahar, Sartaj Sahni, Eugene Shragowitz

June 1985 **Proceedings of the 22nd ACM/IEEE conference on Design automation****Publisher:** ACM PressFull text available:  [pdf\(644.54 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

The performance of simulated annealing is compared to that of other Monte Carlo methods for optimization. Our experiments show that these other methods often perform better than simulated annealing.

Keywords: Monte Carlo method, heuristic, optimization, simulated annealing

31 Variable-sample methods for stochastic optimization

Tito Homem-De-Mello

April 2003 **ACM Transactions on Modeling and Computer Simulation (TOMACS)**, Volume 13 Issue 2**Publisher:** ACM PressFull text available:  [pdf\(244.36 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In this article we discuss the application of a certain class of Monte Carlo methods to stochastic optimization problems. Particularly, we study *variable-sample* techniques, in which the objective function is replaced, *at each iteration*, by a sample average approximation. We first provide general results on the *schedule* of sample sizes, under which variable-sample methods yield consistent estimators as well as bounds on the estimation error. Because the convergence analysis i ...

Keywords: Monte Carlo methods, pathwise bounds, random search, stochastic optimization

32 Cross-entropy and rare events for maximal cut and partition problems



Reuven Y. Rubinstein

January 2002 **ACM Transactions on Modeling and Computer Simulation (TOMACS)**,
Volume 12 Issue 1

Publisher: ACM Press

Full text available: pdf(271.84 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We show how to solve the maximal cut and partition problems using a randomized algorithm based on the *cross-entropy* method. For the maximal cut problem, the proposed algorithm employs an auxiliary Bernoulli distribution, which transforms the original deterministic network into an associated stochastic one, called the *associated stochastic network* (ASN). Each iteration of the randomized algorithm for the ASN involves the following two phases: (1) Generation of random cuts using a mul ...

Keywords: Combinatorial optimization, cross-entropy, importance sampling, rare event simulation

33 Optimization by simulated evolution with applications to standard cell placement



Ralph-Michael Kling, Prithviraj Banerjee

January 1991 **Proceedings of the 27th ACM/IEEE conference on Design automation**

Publisher: ACM Press

Full text available: pdf(793.15 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This paper presents a mathematical formulation of the Simulated Evolution algorithm, a novel optimization technique, followed by a thorough analysis of the associated Markovchain model. We show that the algorithm will reach a global minimum with probability one, and also introduce a novel hierarchical placement technique. Finally, we describe a Standard Cell placement program based on the new approach whose preliminary results are comparable to the best Simulated Annealing algorithms. ...

34 Simulation-based scheduling: Schedule evaluation: simulation optimization for process scheduling through simulated annealing

Alex Cave, Saeid Nahavandi, Abbas Kouzani

December 2002 **Proceedings of the 34th conference on Winter simulation: exploring new frontiers**

Publisher: Winter Simulation Conference

Full text available: pdf(221.41 KB) Additional Information: [full citation](#), [abstract](#), [references](#)

This paper presents a simulation optimization of a real scheduling problem in industry, simulated annealing is introduced for this purpose. Investigation is performed into the practicality of using simulated annealing to produce high quality schedules. Results on the solution quality and computational effort show the inherent properties of the simulated annealing. It is shown that when using this method, high quality schedules can be produced within reasonable time constraints.

35 Metaheuristics in combinatorial optimization: Overview and conceptual comparison

Christian Blum, Andrea Roli

September 2003 **ACM Computing Surveys (CSUR)**, Volume 35 Issue 3



Publisher: ACM Press

Full text available: pdf(431.84 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The field of metaheuristics for the application to combinatorial optimization problems is a rapidly growing field of research. This is due to the importance of combinatorial optimization problems for the scientific as well as the industrial world. We give a survey of the nowadays most important metaheuristics from a conceptual point of view. We outline the different components and concepts that are used in the different metaheuristics in order to analyze their similarities and differences. Two v ...

Keywords: Metaheuristics, combinatorial optimization, diversification., intensification

36 [Simulation optimization with the linear move and exchange move optimization algorithm](#)



Marcos Ribeiro Pereira Barretto, Leonardo Chwif, Tillal Eldabi, Ray J. Paul

December 1999 **Proceedings of the 31st conference on Winter simulation: Simulation--a bridge to the future - Volume 1**

Publisher: ACM Press

Full text available: pdf(89.23 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

37 [A flexible datapath allocation method for architectural synthesis](#)



Kyumyung Choi, Steven P. Levitan

October 1999 **ACM Transactions on Design Automation of Electronic Systems (TODAES)**, Volume 4 Issue 4

Publisher: ACM Press

Full text available: pdf(195.48 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We present a robust datapath allocation method that is flexible enough to handle constraints imposed by a variety of target architectures. Key features of this method are its ability to handle accurate modeling of datapath units and the simultaneous optimization of direct objective functions. The proposed method consists of a new binding model construction scheme and an optimization technique based on simulated annealing. To illustrate the flexibility of this method, two datapath allocation ...

Keywords: allocation and binding, high-level synthesis

38 [Algorithm 744: a stochastic algorithm for global optimization with constraints](#)



F. Michael Rabinowitz

June 1995 **ACM Transactions on Mathematical Software (TOMS)**, Volume 21 Issue 2

Publisher: ACM Press

Full text available: pdf(1.30 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#), [review](#)

A stochastic algorithm is presented for finding the global optimum of a function of n variables subject to general constraints. The algorithm is intended for moderate values of n , but it can accommodate objective and constraint functions that are discontinuous and can take advantage of parallel processors. The performance of this algorithm is compared to that of the Nelder-Mead Simplex algorithm and a Simulated Annealing algorithm on a variety of nonlinear ...

Keywords: constrained optimization, global optimization, stochastic optimization, test

functions

39 Enhanced simulated annealing for automatic reconfiguration of multiprocessors in space



J. R. Slagle, A. Bose, P. Busalacchi, C. Wee

June 1989 **Proceedings of the 2nd international conference on Industrial and engineering applications of artificial intelligence and expert systems - Volume 1 IEA/AIE '89**

Publisher: ACM Press

Full text available: pdf(713.91 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This paper describes our recent results in developing enhanced simulated annealing algorithms using a LISP environment. The application is to use simulated annealing for automatic reconfiguration of multiprocessors in space. Our approach to solving this problem involves a combination of object-oriented programming, search strategies, knowledge based reasoning, and an advanced reconfiguration algorithm. The application was developed and is being enhanced on a LISP workstation (Xerox Dandelio ...

40 VLSI cell placement techniques



K. Shahookar, P. Mazumder

June 1991 **ACM Computing Surveys (CSUR)**, Volume 23 Issue 2

Publisher: ACM Press

Full text available: pdf(5.28 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

VLSI cell placement problem is known to be NP complete. A wide repertoire of heuristic algorithms exists in the literature for efficiently arranging the logic cells on a VLSI chip. The objective of this paper is to present a comprehensive survey of the various cell placement techniques, with emphasis on standard cell and macro placement. Five major algorithms for placement are discussed: simulated annealing, force-directed placement, min-cut placement, placement by numerical optimization, a ...

Keywords: VLSI, floor planning, force-directed placement, gate array, genetic algorithm, integrated circuits, layout, min-cut, physical design, placement, simulated annealing, standard cell

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